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10/591,475	09/01/2006	Mitsuo Takashima	295882US0X PCT	1462
22850	7590	12/12/2008	EXAMINER	
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			SHEVIN, MARK L	
			ART UNIT	PAPER NUMBER
			1793	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/591,475	Applicant(s) TAKASHIMA ET AL.	
	Examiner Mark L. Shevin	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 1-18, filed September 2nd, 2008, are currently under examination. Compared to the claims filed September 1st, 2006 and examined in the previous Office Action mailed June 2nd, 2008:

Amended: Claim 1

New: Claims 12-18

Status of Previous Rejections

2. The previous rejections of claims 1-11 under 35 U.S.C. 103(a) over **Koike** (US 2002/0179207) in view of **Ibaraki** (JP 2000-337333) have been withdrawn.

Claim Rejections - 35 USC § 103

3. **Claims 1-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ibaraki** (JP 2000-337333 – Full human translation) in view of **Koike** (US 2002/0179207).

Ibaraki:

Ibaraki, drawn to a high-strength bolt with excellent delayed fracture resistance and a tensile strength of over 1200 N/mm² (Abstract), teaches such a bolt as having proeutectoid ferrite, free cementite, bainite, and martensite phase fractions controlled to under 20% with a remainder of pearlite (Abstract and para 0007).

Ibaraki teaches that it is necessary to control the generation of proeutectoid ferrite, free cementite, bainite, and martensite as much as

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possible, especially below 20% and to make pearlite greater than 80% (para 0012).

The alloying additions and their differences between the prior art and the instant claims are presented in the table below:

Elements	Ibaraki	Instant Claim 1	Overlap
C	0.5 - 1	0.5 - 1	0.5 – 1
Si	0 < 2	0.55 - 3	0.55 – 2
Mn	0.2 – 1.0	0.2 - 2	0.2 – 1
P	0 < 0.03	0.0001 – 0.03	0 < 0.03
S	0 < 0.03	0 < 0.03	0 < 0.03
Al	0.01 – 0.05	0 < 0.3	0.01 – 0.05
Cr	0.01 - 0.5	0 < 2.5	0.01 - 0.5
Co	0 < 0.5	0 < 0.5	0 < 0.5
Ni	0 < 1.0	0 < 1.0	0 < 1.0
Cu	0 < 0.5	0 < 1.0	0 < 0.5
Mo, V, Nb, Ti, W	0.01 - 0.5	0 < 0.5	0.01 - 0.5
B	0.0005 – 0.003	0 < 0.003	0.0005 – 0.003

With respect to silicon content, Ibaraki teaches that Si raises the hardenability, deoxidizes the metal, dissolves into ferrite to solid-solution strengthen the steel, and suppresses the deposition of free cementite. The content should be kept below 2.0 wt% to kept the ductility from falling too low for wire drawing (para 0018).

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The bolt is formed by wire drawing, cut to length, the head formed by warm forging, and then the threads are cut (para 0007). Strong wire drawing is used because it disperses cementite in the pearlite to impart crack resistance (para 0014). Warm forging is used instead of cold forging because it is more difficult to form the bolt head by cold forging due to the very high strength of the wire rod (para 0039).

Ibaraki does not teach subjecting the bolt to a bluing treatment.

Koike:

Koike, like Ibaraki, is drawn to a high-strength bolt having excellent delayed fracture resistance and stress relaxation resistance with a tensile strength of over 1200 N/mm² (Abstract), teaches producing a steel wire of the composition listed in the table below, with a total areal rate of pro-eutectoid ferrite, pro-eutectoid cementite, bainite, and martensite of less than 20% with the remainder as pearlite (para 0008).

Elements	Koike	Ibaraki	Overlap
C	0.5 - 1	0.5 - 1	0.5 – 1
Si	0 < 0.5	0 < 2	0 – 0.5
Mn	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0
P	0 < 0.03	0 < 0.03	0 < 0.03
S	0 < 0.03	0 < 0.03	0 < 0.03
Al	0.01 – 0.05	0.01 – 0.05	0.01 – 0.05
Cr	0 - 0.5	0.01 – 0.5	0.01 - 0.5

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Co	0 < 0.5	0 < 0.5	0 < 0.5
Ni	0 < 1.0	0 < 1.0	0 < 1.0
Cu	0 < 0.5	0 < 0.5	0 < 0.5
Mo, V, Nb, Ti, W	0 - 0.3	0.01 – 0.5	0.01 – 0.3
B	Not stated	0 < 0.003	n/a

The steel wire is formed into a bolt by wire-drawing the steel (para 0015), cold heading the wire into a bolt shape (para 0021) and then blueing in the range of 100 – 400 °C to increase the bolt strength and improve the proof stress ratio and relaxation resistance (para 0020).

Koike does not teach the content of silicon in the claimed range of 0.55 – 3 wt% but does teach that the beneficial effects of Si (improving hardenability, deoxidation, and solid-solution strengthening) all improve with increasing Si content, but at the expense of ductility (para 0026). Koike and Ibaraki teach Si as a valuable element in terms of increasing mechanical properties but differ only what they consider as the maximum level acceptable for ductility purposes.

Regarding claim 1, 13, and 15, Ibaraki discloses a high strength bolt with the same strength, a substantially overlapping composition, a substantially similar and specific microstructure, and is produced by a substantially similar method save warm-forging vs. cold-heading and the absence of a final blueing treatment.

Ibaraki teaches that it is “difficult” to cold forge the bolt (para 0039) but does not preclude the process or state that it would not work. In view of the

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substantial similarities in composition, strength, and final microstructure, one would reasonably expect the two products to possess the same properties.

As the instant claim is written as a product-by-process claim, once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

It would have been obvious to one of ordinary skill in high strength steel processing, at the time of the invention, to subject the high strength bolt of Ibaraki to a blueing treatment such as that of Koike as Koike taught that blueing in the range of 100 – 400 °C increases the bolt strength and improves the proof stress ratio and relaxation resistance (para 0020).

Koike teaches the tempering temperature (para 0003 and 0020) to be an art recognized result effective variable effective in increasing bolt strength. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980). MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

Regarding claims 2-5, 7-8, 10, 12, 14, and 16-18, both Ibaraki and Koike teach steel compositions with alloying additions that fall in the instantly claimed ranges as shown in the tables above. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

Regarding claims 6 and 9, Ibaraki teaches limiting the boron content to a maximum of 0.0025 wt% (para 0025) to improve the hardenability of the steel while prevent toughness from degrading and it would have been obvious to incorporate the boron content of Ibaraki in the bolt of Koike for the reasons stated by Ibaraki.

Regarding claim 11, Koike teaches that the balance of the steel composition in the bolt is substantially Fe with inevitable impurities such as O (para 0038). Ibaraki implicitly teaches the balance as Fe and inevitable impurities as the bolt of Ibaraki's invention is made of steel which inherently has Fe as the balance and furthermore unavoidable impurities.

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Regarding claim 13, Koike teach the tempering temperature (para 0003 and 0020) to be an art recognized result effective variable effective in increasing bolt strength. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

Response to Applicant's Arguments:

3. Applicants assert (p. 6, para 2-3) that Koike teaches away from the claimed invention in limiting the content of silicon to less than 0.5 wt% in teaching, for example, that "the excessive Si content is likely to lower the ductility as well as the cold headability of the steel wire."

In response, the new grounds of rejection in this Office action now uses Ibaraki as a primary reference, and Ibaraki clearly discloses silicon in the broad range of $0 < 2$ wt%.

While Koike does not teach the content of silicon in the claimed range of 0.55 – 3 wt%, Koike does teach that the beneficial effects of Si (improving hardenability, deoxidation, and solid-solution strengthening) all improve with increasing Si content, but at the expense of ductility (para 0026). Koike and Ibaraki teach Si as a valuable element in terms of increasing mechanical

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properties but differ only what they consider as the maximum level acceptable for ductility purposes.

Applicants point to comparative example F in Koike as evidence of teaching away in showing a steel bolt with a 0.89% Si content as having cracked and thus unacceptable for use.

In response, Applicants have not demonstrated how cold heading or the silicon content affects the final bolt product. Cracking during cold heading in a comparative example may be remedied, for example by warm forging as taught by Ibaraki and there is no indication that such a change would alter the final structure of the claimed product. Furthermore (Table 3), comparative example F, corresponding to test no 8, showed high strength, excellent drawability, and satisfactory delayed fracturability properties.

Applicants assert on p. 7 are moot in view of the new grounds of rejection applied in this Office Action.

Conclusion

-- Claims 1-18 are rejected

-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any

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amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1793

/Roy King/
Supervisory Patent Examiner, Art Unit 1793

December 3rd, 2008
10-591,475